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ABSTRACT

Based upon prior research in the College of Business and Public Administration and the first year of the university testing program at an upper division, midwestern university, implications for testing of older transfer students are drawn. Students should be tested before, or during, their first term of academic history. If remediation is not required immediately after a student does not pass the examination, a retest is an acceptable option during the first term of enrollment. Any deficiencies should be remediated as soon as possible, preferably during the student's second term of academic history. This study produced the first known test-retest reliability coefficients for the Test of Standard Written English (TSWE) and Elementary Algebra skills of the Descriptive Tests of Mathematics Skills (DTMS). Based upon small samples with restricted ranges of scores, impressive psychometric statistics were generated. There were coefficients of 0.78 for the TSWE and 0.72 for the DTMS. (Author)

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ABSTRACTIMPLICATIONS OF A LITERATE SKILLS TESTING MODEL DESIGNED TO ASSESS
ENGLISH-USAGE AND MATHEMATICS COMPETENCIES OF OLDER, ADULT TRANSFER STUDENTS

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Based upon prior research in the College of Business and Public Administration and the first year of the university testing program at an upper division, midwestern university, implications for testing of older, adult transfer students are drawn. Students should be tested before or during their first term of academic history. If remediation is not required immediately after a student does not pass the examination, a retest is an acceptable option during the first term of enrollment. Any deficiencies should be remediated as soon as possible, preferably during the student's second term of academic history.

A serendipitous spin-off from this study was the first known test-retest reliability coefficients for the Test of Standard Written English and Elementary Algebra Skills of the Descriptive Tests of Mathematics Skills. Based upon small samples with restricted ranges of scores, impressive psychometric statistics were generated. These were coefficients of 0.78 for the TSWE and 0.72 for the DTMS.

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IMPLICATIONS OF A LITERATE SKILLS TESTING MODEL DESIGNED TO ASSESS
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Suddick and Vaccaro (1983) described the literate skills testing program implemented at an upper division, midwestern university in 1983. Two areas were assessed, English-usage and mathematics. The verbal skill was measured by the Test of Standard Written English (Educational Testing Services, 1974-1978), and quantitative competency was ascertained by the Elementary Algebra Skills of the Descriptive Tests of Mathematics Skills (Educational Testing Services, 1979).

Prior to the implementation of the university testing program, the College of Business and Public Administration at the institution used the cited examinations to assess skill levels of entering students and to identify students required to remediate their weakness. Students were tested during their first term and no retests were permitted. Remediation was usually during their second term of enrollment.

One year academic success was investigated. It was found to be highest for students passing the TSWE at the norming population median score or higher, lower for students passing the remedial course, and lowest for

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students yet to demonstrate competency via remediation (Suddick, 1981, 1982).

The mathematics component of the collegial testing program was composed of the Elementary Algebra and Intermediate Algebra tests of the DTMS. Remediation for juniors not passing both quantitative examinations was found to be successful (Suddick and Collins, 1982). Similar trends were found for graduate students, also (Suddick and Collins, 1984c).

The separate analyses of the TSWE and DTMS were augmented by a longitudinal inquiry of the concurrent pattern for both areas assessed. For undergraduate students meeting both competencies by any combination of testing and remediation, their academic success rate was 61 percent greater than students with one or both deficiencies. Regarding attrition, deficient students had a 66 percent higher rate of dropping-out than those fulfilling their basic skill competencies (Suddick and Collins, 1984b). Similar trends were found for graduate students (Suddick and Collins, 1984a).

While sufficient time has not elapsed to conduct longitudinal validation analyses similar to those reviewed, the immediate implications of the university literate skills testing model designed to assess the English-usage and mathematics competencies of older, adult transfer students are examined. Specifically, an analysis of the pass-fail status of test results is tied to transfer credentials and demographic variables as well as to test administration patterns. In addition, students, under the policy, were allowed to retest. Thus, their second test scores were tied to their first

so that success at the second testing based upon first testing results are investigated. These data were also analyzed to provide the first available test-retest reliability coefficients for the TSWE and DTMS.

Subjects

In the Fall trimester of 1983, the testing policy was implemented and was applicable for 582 students. Approximately 62 percent of the group were females, and 81 percent were white. Blacks represented 15 percent of the students with the rest being from other ethnic groups. Over 99 percent of the students were U.S. citizens.

Their median age was 27 years. However, most of the students, 61 percent, had attended another institution of higher education in 1983. Of the remaining students, over 25 percent had attended their prior college in 1981 or 1982. Their median hours of prior academic history accepted by the institution was 70 semester units. Their median cumulative transfer grade point average based upon all prior course work was 2.93 on a 4.0 scale.

Method

Students had the option of testing any term, but they were required to meet both requirements before being allowed to enroll for over 20 cumulative hours of credit. While the requirements could be met by passing

the test or by passing the equivalent course, the pass-fail test status on their first attempt was investigated by academic term of administration.

Next, the pass-fail status of students was investigated by transfer credit in related course work; English 101 and 102 grades for the TSWE, and pre-algebra, algebra and post-algebra grades for the DTMS. For English-usage and mathematics, the predictions systems were expanded by singularly investigating: age, sex, ethnic background, years between prior and current enrollment in college, number of transfer hours, transfer grade point average, and last institution attended.

Finally, students failing the TSWE and/or DTMS on their first attempt had the option to retest. Thus, their second attempt pass-fail status was tied to their first attempt scores. In addition, test-retest reliability coefficients were generated for the TSWE and DTMS.

Findings

The English-usage and mathematics components of the testing policy are analyzed and presented separately.

English-Usage

From the Fall term of 1983 through the Fall term of 1984, 331 students challenged the TSWE, and 174 students, 53 percent, passed the examination on their first attempt. The number of students passing and failing the TSWE for the four terms is presented in Table 1.

Insert Table 1 about here

Per the chi-square test, the distribution of pass-fail over the four terms, did not vary significantly (chi-square = 2.41, df = 3, $p < 0.30$). Thus, students with weaker backgrounds do not defer testing and most students opt for testing early in their program of study; i.e., 67 percent in their first term and 17 percent in their second term.

The pass-fail status of the students on their first attempt on the TSWE was investigated by grades earned in English 101 and English 102. Via discriminant analysis, it was found that the students who tended to pass the TSWE had (1) earned an A or B in both English courses, (2) earned an A or B in English 101 but did not enroll in English 102, or (3) did not enroll in English 101 but earned an A or B in English 102. For the 174 students who passed the TSWE on their first attempt, 112 or 64 percent met the A-B condition for English 101-102. For the 157 who did not pass the TSWE on their first attempt, 93 or 59 percent did not meet the A-B condition for English 101-102. Thus, 205 of the students, 62 percent, were properly classified. The cross classification for actual and predicted pass-fail status is presented in Table 2.

Insert Table 2 about here

The classification distribution, actual-projected versus pass-fail status, was significantly different than pure chance; i.e., corrected chi-square = 17.53 (df = 1, $p < 0.0005$). Nevertheless, the overall classification rate of 62 percent was less than desired for any one student. Thus, the discriminant system was expanded to seven models. The models included the English 101-102 grade patterns and one of the following demographic-scholastic variables: age, sex, ethnic background, duration between prior and current enrollment in college, transfer hours, transfer grade point average, and transfer institution. The percentages of cases properly classified by each expanded model is presented in Table 3.

Insert Table 3 about here

In comparison to the model with English 101-102 grades, the expanded models with one additional demographic or scholastic variable did not enhance the classification system. Thus, English course backgrounds of the students was the best single predictor of success on the TSWE and that system could not be expanded.

For the 161 students who did not pass the TSWE on their first attempt, 53 opted for retesting. In total, 13 passed on their second attempt, but 40 did not. All successful second attempts were for scores within three standard errors of measurement of the norming median. Fifteen of the non-

successful retests were within the three standard errors limit and all 25 below that limit were second attempt fails. The distribution of first attempt scores and second attempt pass-fail statuses are provided in Table 4.

Insert Table 4 about here

The pass-fail status at retest by scores within three standard errors of measurement of the passing standard score (36 to 43) versus scores below that range was investigated by chi-square test. The corrected statistic resulted in a value of 12.96 ($df = 1$, $p < 0.001$). Thus, success at retesting was tied to initial competency as measured by the TSWE.

Regarding the test-retest reliability of the TSWE, Form WWE32, the coefficient was 0.78 ($df = 51$, $p < 0.005$). It should be noted that the coefficient is a low bias estimate since only scores below the norming median were included as test scores and the range of scores at retesting was abated, but not much for the initial test scores.

Mathematics

From the Fall term of 1983 through the Fall term of 1984, 298 students challenged the DTMS and 195 students, 65 percent, passed the examination on their first attempt. The number of students passing and failing the DTMS for the four terms is presented in Table 5.

Insert Table 5 about here

Per the chi-square test, the distribution of pass-fail over the four terms, did vary significantly (chi-square = 5.22, df = 3, $p < 0.20$). Thus, students with weaker backgrounds did not tend to defer testing. However, most students opt for testing early in their program of study; i.e., 66 percent in their first term and 17 percent in their second term.

The pass-fail status of the students on their first attempt on the DTMS was investigated by grades earned in college mathematics courses. Via discriminant analysis, it was found that the students who tended to pass the DTMS had (1) earned an A or B in a pre-college algebra course, (2) earned an A, B or C in college algebra, or (3) earned an A, B, C or D in a post-college algebra course. For the 195 students who passed the DTMS on their first attempt, 159 or 82 percent met the cited conditions. For the 103 who did not pass the DTMS on their first attempt, 70 or 68 percent did not meet the above conditions. Thus, 229 of the students, 77 percent, were properly classified. The cross classification for actual and predicted pass-fail status is presented in Table 6.

Insert Table 6 about here

The classification distribution, actual-projected versus pass-fail status, was significantly different than pure chance; i.e., corrected chi-square = 69.90 (df = 1, $p < 0.0005$). Nevertheless, the overall classification rate of 77 percent was less than desired for any one student. Thus, the discriminant system was expanded to seven models. The models included the mathematics grades and patterns and one of the following demographic-scholastic variables: age, sex, ethnic background, duration between prior and current enrollment in college, transfer hours, transfer grade average and transfer institution. The percentages of cases properly classified by each expanded model is presented in Table 7.

Insert Table 7 about here

In comparison to the model with grades in mathematics courses, the expanded models with one additional demographic or scholastic variable did not enhance the classification system. Thus, mathematics course backgrounds of the students was the best single predictor of success on the DTMS and that system could not be expanded.

For the 103 students who did not pass the DTMS on their first attempt, 63 opt for retesting. In total, 17 passed on their second attempt, but 46 did not. All successful second attempts were for scores within one

standard error of measurement of the cutting score. Ten of the non-successful retests were within the one standard error limit and 36 below that limit were second attempt fails. The distribution of first attempt scores and second attempt pass-fail statuses are provided in Table 8.

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Insert Table 8 about here
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The pass-fail status at retest by scores within one standard error of measurement of the passing standard score (207 to 209) versus scores below that range was investigated by chi-square test. The corrected statistic resulted in a value of 27.90 ($df = 1$, $p < 0.001$). Thus, success at retesting was tied to initial competency as measured by the DTMS.

Regarding the test-retest reliability of the Elementary Algebra Skills test of the DTMS, Form A, the coefficient was 0.72 ($df = 61$, $p < 0.005$). It should be noted that the coefficient is a low bias estimate since only scores below the norming median were included as test scores and the range of scores at retesting was abated but not much for the initial test scores.

Summary

Under a liberal testing policy allowing students the option to meeting literate skill competency demonstration prior to their enrollment over a total of 20 cumulative hours, most students chose to be tested during their

first term of enrollment. Regarding the issue of weaker students deferring testing beyond their first term of enrollment, the supposition was not supported for English or mathematics.

Regarding success on nationally standardized examinations, past related course enrollment patterns and grades resulted in acceptable group rates of overall pass-fail status; i.e., 62 percent for the TSWE and 77 percent for the DTMS. These rates could only be marginally enhanced by age, sex, ethnic background, time lapse between prior enrollment in college and re-enrollment, number of transfer hours, transfer grade average and transfer institution.

While success at the initial test could not be generally predicted, success at retest could. For the TSWE, no student below three standard errors of measurement for the initial testing passed on the second attempt. A similar trend was found for the DTMS, but the band of successful retests was for scores within one standard error of measurement of the cutting score.

Only students failing the tests were retested on a voluntary basis. Thus, estimates of the test-retest reliability of the TSWE and DTMS were generated, but these estimates are low bias. For the TSWE, Form WWE32, the coefficient based upon 53 cases was an impressive 0.78. A similar coefficient, 0.72, based upon 63 cases was found for the Elementary Algebra Skills Tests of the DTMS, Form A.

Implications

Based upon the review of the literature and the findings of this study, trends and implications of testing older, adult transfer students are drawn. Until superceded by ensuing empirical research, it is recommended that:

1. Students be tested as soon in their academic program as possible.
2. Prior academic histories and demographic variables, while acceptable group predictors, will not suffice for individual student test results.
3. If remediation is not demanded immediately upon failing the examination, a second testing (retest) is an acceptable option.
4. If the retest option is exercised, students should be apprised of their initial test scores and their probability of success on retesting. In this study, initial test scores beyond one to three standard errors of measurement of the cutting scores were found to have a zero percent rate of success at retest. Thus, local studies are needed to ascertain these bands.
5. Remediation should be required as soon as possible in a student's academic program.

Table 1

Number and Percentage of Students Attempting the Test of Standard Written English for the First Time by Academic Term

Trimester	<u>Passing</u>		<u>Failing</u>	
	N	%	N	%
Fall, 1983	115	34.7	107	32.3
Winter, 1984	26	7.9	29	8.8
Summer, 1984	16	4.8	9	2.7
Fall, 1984	17	5.1	12	3.6
Total	174	52.6	157	47.4

Table 2

Actual and Predicted Test of Standard Written English Pass and Fail Statuses Based Upon English 101-102 Grades*

Projected Results	Test Results	
	Pass	Fail
Pass	112	64
Fail	62	93

*Projected pass by prior English grades:

- (a) earned an A or B in both English 101 and 102.
- (b) earned an A or B in English 101, but did not enroll in English 102.
- (c) earned an A or B in English 102, but did not enroll in English 101.

Table 3

Percentage of Test of Standard Written English Pass and Fail
Statuses Properly Classified by Selected Discriminant Analysis Models

English 101 and 102 Grades and	Percent*
Age	62.6
Sex	62.7
Ethnic background	63.6
Years last enrolled in college	62.6
Transfer hours	62.4
Transfer grade point average	62.4
Transfer institution	62.8

*61.9% properly classified by English grades only.

Table 4

Pass-Fail Status on Test of Standard Written English
on Second Attempt by First Attempt Scores

First Attempt Standard Score	Second Attempt	
	Pass	Fail
43	2	2
42	2	3
41	4	2
40	1	1
39	1	1
38	0	2
37	1	1
36	2	3
35	0	3
34	0	2
33	0	2
32	0	2
31	0	3
≤ 30	0	13

Table 5

Number and Percentage of Students Attempting the Descriptive Tests of Mathematics Skills for the First Time by Academic Term

Trimester	Passing		Failing	
	N	%	N	%
Fall, 1983	137	46.0	60	20.1
Winter, 1984	31	10.4	20	6.7
Summer, 1984	13	4.4	13	4.4
Fall, 1984	14	4.7	10	3.4
Total	195	65.4	103	34.6

Table 6

Actual and Projected Elementary Algebra Descriptive Tests of Mathematics Skills: Pass and Fail Statuses Based Upon Prior Mathematics Grades*

Projected Results	Test Results	
	Pass	Fail
Pass	159	33
Fail	36	70

*Projected pass by prior mathematics grades:

- (a) earned an A or B in pre-algebra course.
- (b) earned an A, B or C in algebra course.
- (c) earned an A, B, C or D in post-algebra course.

Table 7

Percentage of Elementary Algebra Descriptive Tests of
Mathematics Skills Tests Pass and Fail Statuses Properly
Classified by Selected Discriminant Analysis Models

Mathematics Grades and	Percent*
Age	78.1
Sex	79.2
Ethnic background	79.4
Years last enrolled in college	78.8
Transfer hours	79.0
Transfer grade point average	79.0
Transfer institution	79.0

*76.8% properly classified by mathematics grades only.

Table 8

Pass-Fail Status on the Elementary Algebra Descriptive Test of
Mathematics Skills on the Second Attempt by First Attempt Scores

First Attempt Standard Score	Second Attempt	
	Pass	Fail
209	7	1
208	4	3
207	6	6
206	0	2
205	0	6
204	0	5
203	0	5
202	0	18

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